

What is the GLOBE Programme?

The GLOBE Programme is an international education programme where pupils measure aspects of their local environment and report their results to GLOBE over the Internet. Data from all the schools around the world are then available for pupils to use to create stunning maps and graphs to use in a wide range of topics, projects and classroom activities. Since 1995 thousands of schools from over 100 countries around the world have been involved.

The GLOBE Programme has three main objectives:

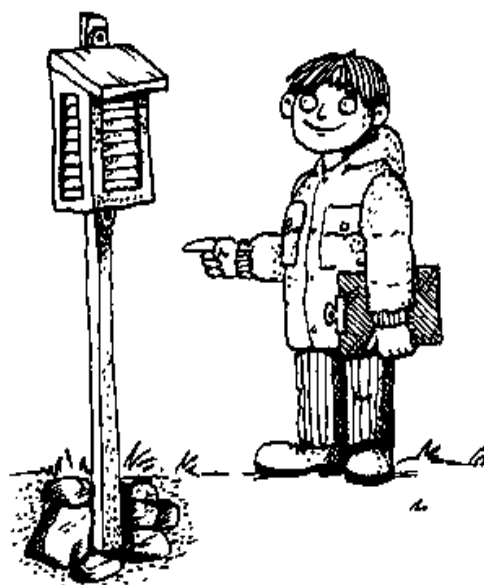
- to enhance the environmental awareness of individuals world wide
- to increase scientific understanding of the Earth
- to provide opportunities for pupils to increase their skills in citizenship, geography, science, numeracy and I.C.T.

How does GLOBE work?

GLOBE works by providing a teaching package linked to the national curriculum. There are standard methods for pupils to measure aspects of the environment. These standards are used throughout the world and they ensure that everyone is recording measurements in a comparable way.

Pupils' data are transmitted to a central GLOBE database from the website www.globe.org.uk This unique data is then available for everyone in the world to see and use.

Using the Internet in this way gives added value to the programme by linking schools throughout the world in a common purpose and by providing pupils with real hands-on participation in a worthwhile exercise.



What does GLOBE measure?

GLOBE starts with a satellite view of a square 15km by 15km surrounding your school - you are provided with this image on disc, once you have entered 250 pieces of data to the database. All measurements for the programme are taken within this area.

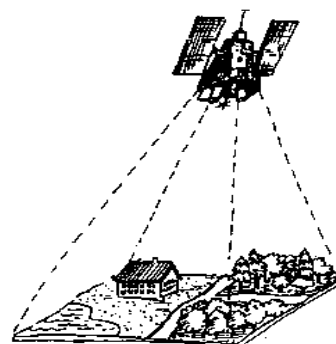
GLOBE-UK has four main areas of investigation,

WEATHER

WATER

SOILS

LAND COVER



Plus two additions, **PHENOLOGY** and
SUSTAINABLE DEVELOPMENT:

Although you could study all of these, it is best to begin with just one or two areas and add others as you find they fit into your planned teaching. Each of these measurements has a study site within your 15km square, mostly in your own school grounds.

Weather studies require a weather station (not difficult to construct if the school does not have one) and some basic equipment.

Water measurements are carried out in the school pond or a nearby river, stream or stretch of coastline.

Soils can be assessed within the school grounds.

Land cover measurements are within a small 30m x 30m study site.

+ **Phenology** includes 'Green-up' in Spring and 'Green-down' in Autumn, as leaves change colour

+ **Sustainable Development** looks at Water, Energy, Biodiversity, Waste and Transport all within your own school or classroom.

How to use this manual

Each section of the manual contains a Teacher Guide and a Pupil Guide.

The Teacher Guide contains lesson notes for each measurement, a summary scheme of work, list of resources and curriculum links.

The Student Guide contains a series of discrete worksheets for you to photocopy.

Teachers' Introduction



Why Choose the GLOBE Programme?

- You will enjoy a unique and stimulating experience by joining one of the biggest international schools programmes ever devised.
- GLOBE makes it easy to link with schools from other countries and to share experiences.
- Your pupils will contribute to the world's scientific knowledge, making the whole GLOBE experience more meaningful for pupils and teachers alike.
- You don't need to be an experienced science or I.C.T. teacher.
- You don't need to design worksheets, extension activities, record sheets or work out the National Curriculum links. They are all provided!
- You don't need to devote lots of time to the programme.... you choose whether to work daily, weekly, monthly or termly – whatever suits your timetable.
- GLOBE is ideal for out-of-hours learning, master classes or small groups.
- The equipment you need may already be in school. Some can easily be made using inexpensive materials and others may be borrowed, free-of-charge from the GLOBE-UK office.

In using the GLOBE Programme your pupils will :

- ✓ Observe and make measurements
- ✓ Record their data
- ✓ Understand the need for accuracy and precision
- ✓ Share data with other pupils
- ✓ Develop theories
- ✓ Test hypotheses
- ✓ Formulate questions
- ✓ Use a variety of scientific equipment
- ✓ Learn to calibrate equipment
- ✓ Use the Internet with confidence
- ✓ Retrieve information for presentation in class
- ✓ Interact with real scientists
- ✓ Help everyone to understand the changes taking place on our planet



We all want to know what is happening to our global environment. Why do changes happen? How do different changes affect one another? What could happen next?

As GLOBE schools continue to make measurements of the local environment, so they give everyone a better knowledge of the planet, both locally and globally.

How to become a GLOBE teacher

1. Visit our website www.globe.org.uk. You can download and try all the GLOBE Programme material in your classroom for free.
2. Check the website or contact us for details of a training session near you. Training is regularly carried out regionally across the UK. If there is no training planned near you let us know and we will do our best to ensure that we arrange a training session to suit you.
3. Contact us to enrol for your one-day training course to become a registered GLOBE teacher. Enrolment forms can be found on our website and on much of our literature.
4. After you have successfully completed the course you will be a registered GLOBE teacher, you will then need to register your school by completing and returning the GLOBE registration form with your school's latitude and longitude.
5. You will then receive a School Identification Code and Password to enable you to put your school's data on the internet.

We recommend that two or more teachers from each school be trained by GLOBE so that you can work with colleagues to share ideas, develop and plan the work. Experience has shown that innovative programmes such as GLOBE enjoy a better chance of success if they are undertaken by a group of mutually supportive teachers.

Once you become a GLOBE school there are many exciting follow-up activities that you can develop, including:

- ❖ International links to other GLOBE schools
- ❖ Using the internet for communication
- ❖ School-wide projects about the local environment
- ❖ Regional links with Millennium Science Centres
- ❖ Projects supported by environmental scientists



GLOBE can then become a vibrant part of your school's identity, involving parents and the wider community.

GLOBE resources

The GLOBE programme provides you with several resources - free of charge. There is a full colour cloud chart to help identify cloud types. You will be given a manual containing teacher guides and pupil worksheets, related to the National Curriculum, which can be photocopied for classroom use. They are designed so pupils can follow the easy step by step instructions. Many of the activities can be adapted to suit a wide ability range.

Later you will receive an exciting satellite image of the area around your school, and software to let you view it.

Related pupil worksheets can be combined to make pupil GLOBE workbooks with full instructions and space to fill in results.

Instruments and equipment

All investigations require accurate instruments that meet the specifications set by the GLOBE scientists.

The equipment is not expensive (a list of suppliers is available from GLOBE) and you may use instruments that you already have in school as long as they meet the accuracy and calibration requirements demonstrated during training. You can also make some of the instruments, following instructions in the toolkit and at the training workshops. Some schools share equipment or you can borrow some from your GLOBE centre on short-term loan.



Once your school is enrolled on the programme and is taking measurements, the only ongoing cost is for Internet access.

National Curriculum Links – K S 2

Geography Key Stage 2

The GLOBE Programme is relevant to all aspects of geographical enquiry at KS2 and lends itself particularly well as a tool to study locality and change

- 1 (a - e) Understanding geographical enquiry
- 2 (a - g) Developing geographical skills
- 3 (a - g) Knowledge and understanding of places
- 4 (a, b) Knowledge and understanding of patterns and processes
- 5 (a, b) Knowledge and understanding of environmental change and SD
- 6 (a - e) Localities and themes (water, change, environmental issues)
- 7 (a - c) Study localities, themes, places and environments including fieldwork

Science Key Stage 2

- SC 1.1(a-b) Ideas and evidence in science
- SC 1.2(a-d) Investigative skills
- SC 1.2(e - h) Obtaining and presenting evidence
- SC1.2 (i - m) Considering evidence and evaluating
- SC 2.1(b) Life processes of plants
- SC 2.3(a) Plant growth is affected by light, temperature and water
- SC 2.3(b - d) Role of leaf, root, stem and reproduction
- SC 2.4(a - c) Make and use keys to identify and assign the variety of locally found plants and animals into groups
- SC 2.5(a) That animals / plants species and their environment need protection
- SC 2.5(b, c) Plants and animals are found in different habitats and are suited to their environment
- SC 3.1d To describe and group rocks / soils on the basis of their characteristics
- SC 3.2(c) Temperature is a measure of how hot or cold things are
- SC 3.2(e) The part played by evaporation and condensation in the water cycle
- SC 3.3(e) The use of knowledge of solids, liquids and gases to decide how mixtures might be separated
- SC 4.3(a, b) Light travels from a source and forms shadows
- SC 4.4(b) The position of the sun appears to change during the day, and shadows change as this happens
- SC 4.4(c) Day and night are related to the spin of the Earth on its axis

I.C.T. Key Stage 2

- 1a Talk about what information they need and how they can find and use it, including searching the internet
- 1b Prepare information for development using ICT
- 2a Develop and bring together ideas, organising and reorganising text, tables, images and sound as appropriate.
- 2b Create, test, improve and refine instructions to make things happen and monitor events and respond to them (for example monitoring changes in weather)
- 2c Use simulations and models to answer, what if? questions (for example spreadsheet models)
- 3a Share and exchange information in a variety of forms including e-mail
- 3b To be sensitive to the needs of the audience and think carefully about the content and quality when communicating information (for example publishing on the internet)
- 4 (a - c) Review what they and others have done to help improve their work; talk about the effectiveness and how they could improve future work

Teachers' Introduction



Mathematics Key Stage 2

- MA 2.1a Make connections and appreciate the need to use numerical skills and knowledge when solving problems
- MA 2.1b Break down a complex problem into simpler steps and identify the information needed to carry out the tasks
- MA 2.1c Select and use appropriate mathematical equipment including ICT
- MA 2.1d Find different ways of approaching a problem
- MA 2.1e Make mental estimates of the answers to calculations; check results
- MA 2.1f Organise work and refine ways of recording
- MA 2.1g Use notation and symbols correctly
- MA 2.1h Present and interpret solutions in the context of the problem
- MA 2.1i Communicate mathematically using precise language
- MA 2.1j Understand and investigate general statements
- MA 2.1k Search for pattern in results; develop logical thinking and explain reasoning
- MA 2.2a Counting on and back, extending into negative integers
- MA 2.2f Recognise the equivalence between decimals and fractions and understand that percentage means number of parts per 100
- MA 2.2i Understand and use decimal notation for tenths and hundredths in context (for example converting m to cm etc.)
- MA 2.3k Use a calculator for calculations involving several digits, including decimals
- MA 2.4e Read and plot co-ordinates in the first quadrant, then in all four quadrants
- MA 3.1(b - d) Select and use appropriate and flexible calculation skills to solve geometrical problems
- MA 3.2a Know that angles are measured in degrees and that one whole turn is 360°
- MA 3.4a Recognise the need for standard units of measurement, length, mass and capacity, choose which ones are suitable for a task and use them to make sensible estimates in everyday situations
- MA 3.4b Recognise that measurement is approximate; choose and use suitable measuring instruments, interpret numbers and read scales with increasing accuracy; record using decimal notation
- MA 3.4e Calculate the perimeter and area of shapes using the formula or counting squares
- MA 4.1a Select and use data handling skills when solving problems in other areas of the curriculum
- MA 4.1(c - e) Identify the data necessary to solve a given problem, use calculation skills and check results
- MA 4.1(f-h) Decide how to best organise and present findings, using precise mathematical language and vocabulary; explain and justify methods and reasoning
- MA 4.2a Solve problems involving data
- MA 4.2b Interpret and construct tables, lists and charts
- MA 4.2c Represent data using a wide range of graphs and diagrams, using ICT where appropriate
- MA 4.2d Understand mode and range and use them to describe data sets

English Key Stage 2

- EN2 5e Understand the structural and organisational features of different types of text
- EN2 5f Evaluate different formats, layouts and presentational devices
- EN2 5g Engage with challenging and demanding subject matter
- EN3 1e Use features of layout, presentation and organisation effectively
- EN3 2 (a - f) Develop writing on paper and on screen

National Curriculum Links – K S 3

Geography Key Stage 3

The GLOBE Programme is relevant to most aspects of geographical enquiry, and breadth of study at Key Stage 3, through the following knowledge, skills and understanding:

- 1 (a-f) Undertaking geographical enquiry, collect, record, present and analyse evidence.
- 2 (a-g) Develop geographical skills, use equipment, maps, satellite images
- 3 (a-e) Knowledge and understanding of how places are interdependent
- 4 (a, b) Knowledge and understanding of patterns and processes
- 5 (a, b) Knowledge and understanding of environmental change and SD

Also through the following themes:

- 6d How and why weather and climate vary.
- 6e Ecosystems
- 6f Population distribution and change
- 6g Changing characteristics of settlements
- 6l Differences of development between countries
- 6j Environmental Issues
- 6k Resource Issues

Science Key Stage 3

- 1.1 (a, b, c) Ideas and evidence in science
- 1.2 (a-e) Investigative skills
- 1.2 (f-l) Obtaining and presenting evidence
- 1.2 (j-m) Considering evidence
- 1.2 (n-p) Evaluating
- 2.3 (a, c, e) Green plants and organisations
- 2.4 (a, b) Variation, classification and inheritance
- 2.5 (a-d, f) Living things in their environment
- 3.3 (d-g) Patterns and behaviour
- 4.4 (e) The earth and beyond
- 4.5 (a-g) Energy resources and transfer

ICT Key Stage 3

- 1 a Consider information systematically and discuss its use
- 1 b Obtain information and select sources, use and refine search methods
- 1 c Collect, enter, analyse and evaluate information
- 2 a Develop and explore information, solve problems
- 2 b Use ICT to measure, record and respond to events (datalogging fieldwork)
- 3 a Interpret information, reorganise and present in a variety of forms
- 3 b Use ICT to create good quality presentations
- 3 c Share and exchange information using the web
- 4d be independent and discriminating in the use of ICT

During the Key Stage pupils should be taught...

- 5 a to use databases
- 5 c to evaluate and suggest improvements to existing systems
- 5 d to compare their use of ICT with its use in the wider world

Teachers' Introduction



English Key Stage 3

En 2.4 (a-d) Develop reading of, printed and ICT based information texts

En 3.1 (e,g,h) Writing to inform, explain, describe, analyse, review and comment

En 3.2 (a) Planning and drafting

Mathematics Key Stage 3

2.1 a Exploring connections and selecting numerical skills to solve problems

2.1 b Breaking down complex calculations into simpler steps

2.1 e Make mental estimates and check results

2.1 f Represent problems and solutions in graphical form

2.1 g Develop notation, symbols and diagrams when solving a problem

2.1 h Examine, improve and then justify choice of mathematical presentation

2.4 a Interpret scales on a range of measuring equipment, know metric equivalents

4.1 a.ii Collect data

4.1 a.iii Process and represent data

4.1 a.iv Interpret and discuss data

4.1 c Select and organise the appropriate maths and resources

4.1 e Interpret, discuss and synthesise information presented in a variety of forms

4.1 f Communicate mathematically, using diagrams

4.1 g Examine and justify their choice of mathematical presentation

4.2 e Design an experiment or survey, decide what secondary data to use

4.3 a Design and use data collection sheets

4.3 b Gather data from secondary sources

4.4 a Draw line graphs, scatter graphs, frequency diagrams

4.4 b Calculate averages

4.5 b Interpret graphs and diagrams, draw conclusions

4.5 c Look at data to find patterns and exceptions

4.5 e Evaluate and check results, answer questions and modify approach

Throughout the Key Stage Students should do activities..

c solving familiar and unfamiliar problems

f involving practical work in which they draw inferences from data

h focusing on using ICT

Teachers' Introduction

Curriculum links are considered in the context of GLOBE measurements as part of a wider investigation or enquiry



	GPS	Rain/snow fall	Temperature	Clouds	Water Temperature	Water pH	Water Turbidity	Soil Characterisation	Particle size	Satellite image	Set up land study site	Vegetation	Ground/canopy cover	Tree measurement	Querying and obtaining data	On-line mapping	On-line graphing	Communicating on-line & e-mail
Geog																		
1 (a-e)	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
2 (a-g)	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
3 (a-g)	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
4 (a,b)		/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/
5 (a,b)		/	/	/	/	/	/	/	/	/		/						
6 (a-e)	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
7 (a-c)		/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/

Science																		
SC 1.1(a, b)	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/
SC 1.2 (a-d)	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
SC 1.2 (e-h)	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/
SC 1.2 (i-m)	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/
SC 2.3a		/	/	/	/	/	/					/	/	/				
SC 2.3 (b-d)								/	/			/	/	/				
SC 2.4 (a-c)										/		/	/	/				
SC 2.5a												/	/	/				
SC 2.5 (b,c)								/	/	/		/	/	/				
SC 3.1d						/	/	/	/	/								
SC 3.2c			/		/													
SC 3.2e		/	/	/	/	/	/											
SC 3.3e								/	/									
SC 4.3 (a,b)	/			/			/			/								
SC 4.4b	/		/	/						/								
SC 4.4c	/		/	/						/								

ICT																		
1a	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/
1b	/	/	/	/	/	/	/	/	/	/		/	/	/	/	/	/	/
2a															/	/	/	/
2b		/	/		/	/		/	/						/	/	/	/
2c															/	/	/	/
3a	/	/	/	/	/	/	/	/	/			/	/	/	/	/	/	/
3b																		/
4 (a-c)	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/

Teachers' Introduction



	GPS	Rain/snow fall	Temperature	Clouds	Water Temperature	Water pH	Water Turbidity	Soil Characterisation	Particle size	Satellite image	Set up land study site	Vegetation	Ground/canopy cover	Tree measurement	Querying and	On-line mapping	On-line graphing	Communicating on-line &
Mathematics																		
MA 2.1a	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.1b	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.1c	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.1d	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.1e	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.1f	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.1g	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.1h	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.1i	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.1j	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.1k	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.2a	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.2f	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.2i	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.3k	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 2.4e	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 3.1	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 3.2a	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 3.4a	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 3.4b	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 3.4e	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 4.1a	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 4.1 (c-e)	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 4.1 (f-h)	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 4.2a	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 4.2b	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 4.2c	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
MA 4.2d	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
English																		
EN 2.5e	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
EN 2.5f	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
EN 2.5g	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
EN 3.1e	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/
EN 3.2 (a-f)	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/